

Dragonfly: On-Orbit Robotic Installation and Reconfiguration of Large Solid RF Reflectors (Dragonfly)

Completed Technology Project (2016 - 2019)



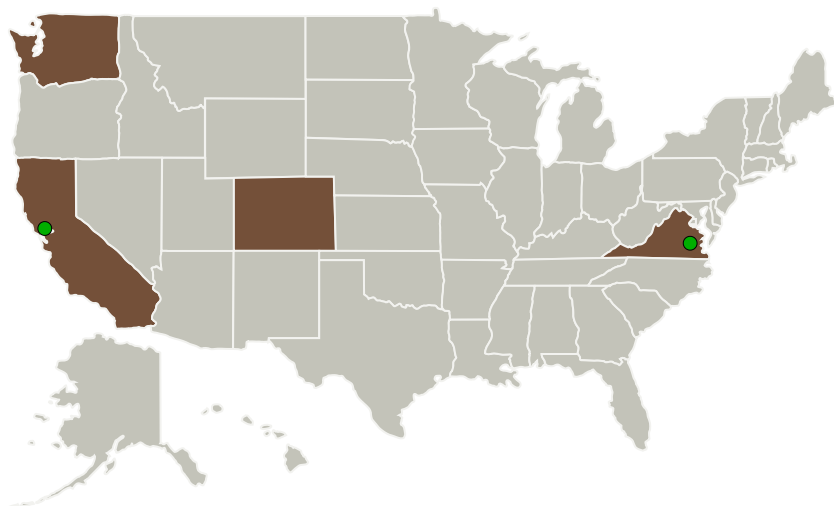
Project Introduction

This ground activity will demonstrate effective stowage of larger than standard reflectors within a launch fairing, robotic assembly techniques, and concept of operations for reflector positioning on a GEO satellite.

Anticipated Benefits

Technologies developed through Dragonfly will enable reconfiguration of traditionally fixed satellite designs.

Primary U.S. Work Locations and Key Partners



In this artist's rendering, the Dragonfly technology enables satellite self-assembly in orbit, a process which could maximize available payload space aboard launch vehicles and decrease launch costs

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| Organizations Performing Work | Role | Type | Location |
|---------------------------------|-------------------------|-------------|---|
| Space Systems/Loral, LLC(SSL) | Lead Organization | Industry | San Jose, California |
| ● Ames Research Center(ARC) | Supporting Organization | NASA Center | Moffett Field, California |
| ● Langley Research Center(LaRC) | Supporting Organization | NASA Center | Hampton, Virginia |
| MDA Canada | Supporting Organization | Industry | Brampton, Outside the United States, Canada |
| MDA US Systems LLC | Supporting Organization | Industry | Pasadena, California |
| Tethers Unlimited Inc | Supporting Organization | Industry | |

Primary U.S. Work Locations

| | |
|------------|------------|
| California | Colorado |
| Virginia | Washington |

Project Transitions

September 2016: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Space Systems/Loral, LLC (SSL)

Responsible Program:

Technology Demonstration Missions

Project Management

Program Director:

Trudy F Kortes

Program Manager:

Tawnya P Laughinghouse

Principal Investigator:

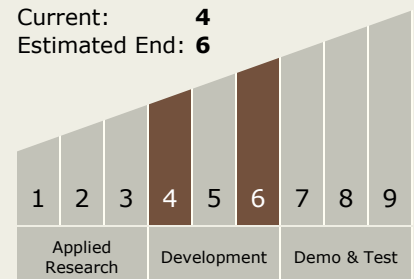
Charles L Adams

Technology Maturity (TRL)

Start: 4

Current: 4

Estimated End: 6



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May 2019: Closed out

Closeout Summary: The Dragonfly Phase 1 Project demonstrated that a robotic system can be created for commercial space applications. It is one third of the mass of state of the art space robotic systems today, the recurring cost is an order of magnitude less, and the support personnel/operating costs are a fraction of today's team size and costs. All objectives were demonstrated: - develop and demonstrate autonomous robotic assembly operating concept with flight-like robotic arm and control software - develop robotic system that readily integrates with existing commercial spacecraft infrastructure - demonstrate assembly joint designed for EVA can be transformed into a robotically compatible assembly joint meeting thermal and mechanical performance requirements of a precision antenna assembly - develop a new RF reflector design that is lighter and cheaper than SOTA and can be assembled in space The project has demonstrated Dragonfly's compatibility with existing spacecraft infrastructure, including sharing on-board processing for robotic arm control, an autonomous control strategy that accommodates the extremely limited communications bandwidth, and the asynchronous commanding/telemetry protocols in the MCC. The Dragonfly robotic system is ready for flight in a commercial system and operating environment.

Images



Dragonfly On-Orbit Robotic Installation and Reconfiguration of Large Solid RF Reflectors.jpg

In this artist's rendering, the Dragonfly technology enables satellite self-assembly in orbit, a process which could maximize available payload space aboard launch vehicles and decrease launch costs

(<https://techport.nasa.gov/image/100910>)

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.3 Mechanical Systems
 - └ TX12.3.1 Deployables, Docking, and Interfaces

Target Destination

Earth

Supported Mission

Type

Push

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Project Website:

https://www.nasa.gov/mission_pages/tdm/main/index.html#.VQb6XUjJzyE